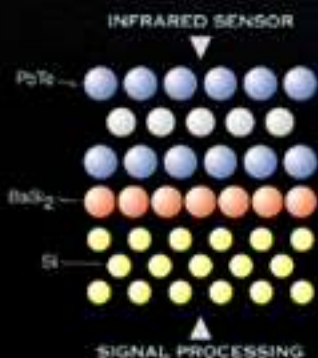


Solid State Technologies

NAVAL SEA SYSTEMS COMMAND



NAVAL SURFACE WARFARE CENTER



DAHLGREN DIVISION
PANAMA CITY DAHLGREN

The Solid State Group engages actively in the understanding of the physical and chemical processes that occur in semiconductors. This group has projects exploring thin film technologies for the next generation of electronic and electro-optic (E-O) devices, as well as developmental programs for new practical devices. The group has concentrated on putting together previously incompatible materials by matching lattice structures using single molecular layer interfaces put down under ultra-high vacuum. The group has designed and engineered a unique linear photoconductive switch for use in pulsed power applications and developed switches for both the Navy and Air Force's high power photoconductive switch programs. The group publishes regularly in scientific and technical journals and holds 20 US patents on semiconductor structures and devices.

Development Objectives

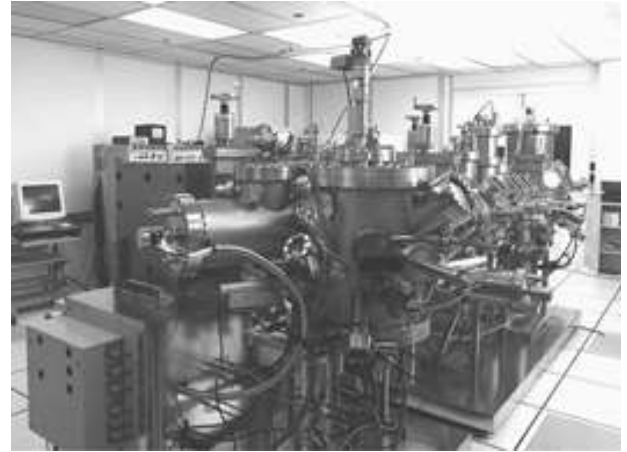
- Smart electronic and electro-optic devices
- Novel semiconductor/insulator structures
- Atom-by-atom solid state chemical reactions
- High speed and submicron transistors
- High power photoconductive switches

Capability

- Solid State Molecular Interactions
- Semiconductor/Insulator Heterostructures
- Electronic and Electro-Optical (E-O) Devices
- Surface Chemical Analysis
- Materials Diagnostic with Ion-Beam, X-Ray and Electron-Beams
- Optically controlled Bulk Semiconductor Switches
- Laser activated Bistable High Power Switches

Facilities

- Molecular Beam Epitaxy (MBE) Apparatus
 - Thin film deposition under ultra-high vacuum
 - Two growth chambers w/K-Cell and E-Beam deposition
 - State of the art in-situ chemical diagnostics
 - X-Ray photoelectron spectroscopy
 - Ultraviolet photoelectron spectroscopy
 - Auger electron spectroscopy
 - Crystal structure diagnostics
 - Reflection high energy electron diffraction
 - Low energy electron diffraction
 - X-ray diffractometer
- Liquid Phase Epitaxy (LPE) system for custom device fabrication
- Class 1000 cleanroom for device processing
 - Mask aligner and photolithography
 - Furnace for diffusion/annealing
 - Rapid thermal annealer
 - Micron feature size
 - Dicing saw
 - RF deposition for metallization and insulator materials



Products

- High quality crystalline films of electronic materials are the basis for novel electronic and E-O devices such as:
 - Barium fluoride on silicon
 - Barium fluoride on gallium arsenide
 - Gallium arsenide on barium fluoride
 - Lead or cadmium telluride on silicon
 - Lead sulfide or lead selenide on silicon
- Ultrathin diffusion barrier layers that can potentially double the circuit density on a silicon chip
- Switches that are operated by light signals for high power, high current switching
- Miniaturized photoconductive switches

NAVAL SEA SYSTEMS COMMAND



Panama City

Dahlgren

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